HELIX AREOLATA.

BY C. R. ORCUTT.

The month of March, 1917, was spent by the writer almost entirely on Magdalena Island, Baja California, Mexico. One day was spent on Santa Margarita Island, separated from Magdalena Island by a channel about ten miles wide, which serves as the main entrance to Magdalena bay to-day, which can be entered, though by small boats, by the two other channels north and south which separate these islands from the peninsula. By dropping the "Santa," as is often done in conversation, we have "Margarita Island," so often mentioned in shell literature, which in turn lent its name to the bay which it helps to protect—hence "Margarita bay," where W. Harper Pease had collected for him seventy-four species of mollusks, as reported by Carpenter.

The industry in orchilla (*Roccella tinctoria*), for dye-stuff, that was developed about forty years ago, when, I am told, as much as a million dollars worth of this lichen was exported to Germany around the Horn in a single year, led to the present settlement on Magdalena Island. Mining for magnesite has now led to another settlement on Santa Margarita Island in recent years, though it seems probable that this settlement really antedated that on Magdalena Island.

Helix areolata was the only land shell reported by Carpenter from Margarita bay in the Pease collection. In vain I searched for the Pupas, found so abundantly further north at San Quintin bay in 1886, on *Roccella tinctoria*, but I doubt not these may yet be found in the vicinity of the bay. on the peninsula if not on the islands, by some more persistent observer upon more thorough exploration of the bay shores. One specimen, not at hand, that may have been *Assiminea californica*, two dead specimens of *Pedipes* (probably *P. liratus*), and numerous living *Melampus olivaceus* were found.

Pilsbry is no doubt right in taking Magdalena bay as the type locality for *Helix areolata* (see Proc. Phil. Acad. 1913, 391), but I would select Santa Margarita Island as probably the exact location.

I would select the same island as the type locality of *Helix pandorae*, credited by Dall to "Margarita Island," I believe, though Pilsbry selects the San Benito Islands, to the northwest of Cedros Island, instead.

Pilsbry selects San Bartolome bay, on the peninsula, as the type locality of *Helix levis*, but it seems to me that Santa Margarita Island could be selected with equal propriety, and this would give us these three "species" as from one "type locality." It can never be exactly known where these types were actually collected, so that any designation of a type locality must be more or less arbitrary.

My series of *Helix areolata* was all collected on Magdalena Island, in a space perhaps a mile square, extending from the ocean to the bay. The species was not confined to this area by any means, and probably occurs in equal abundance over the entire region around Magdalena bay. In places the ground is white with the dead shells, and millions may be found drifting in the adjacent sand hills on Magdalena Island.

The scant desert vegetation, such as agave, fouquiera, and other plants, often harbored considerable colonies of living snails. The shells on the bushes would often be found in the morning covered with sand, indicating that they burrow in the soil, probably climbing the plants for feeding purposes and some staying over time. All my specimens were obtained from the plants, however, and not by digging. I doubt not that every figure on Pilsbry's two plates (Proc. Phil. Acad. 1913, plants 15 and 16, figs. 1 to 52) could be matched by specimens living in the area of the square mile referred to.

Many specimens were a solid chalky white, with no trace of bands or color. Some have a strongly developed tooth; most of the individuals show no trace of one. Some specimens, old and mature, but usually rather small, were of a uniform pale olivaceous-brown color, without signs of bands or other color, that would answer well for Binney's figure of *Helix pandorae*. Some individuals were as elevated as *Helix veatchii* is figured as being, and other shells are nearly as depressed as *Helix Traskii*. Young individuals would answer for Pfeiffer's figures of *Helix decorata* or *H. levis*.

A colony of these snails, on leafy shrubs growing on sand hills near the ocean, supplied the smallest individuals. Snails on salicornia and other plants providing abundant shade furnished perhaps the largest number of solid white shells.

Midway between the ocean and the bay, on an exposed plateau, I found the largest number of highly-colored shells, many immature or just come to maturity, on leafless plants like fouquiera, where the variegated color was an excellent protection. It was very difficult to see these snails on the bushes, even near at hand, except as projecting knobs on the stems against a background of sky.

The usually chalky-white shell seems to have a chocolate-brown epidermis, which varies in intensity at different stages of its growth, often nearly or quite absent, thus producing the irregularly interrupted and very variable bands. This colored stratum is thin and can be worn away with a knife-blade without injury to the shell, and in age seems to naturally but irregularly wear away, producing as many designs as there are individuals.

I have collected thousands of specimens called *Helix levis* at San Quintin bay, at the Rosario mission some eighty miles southward, and on the peninsula east of Cedros Island, which seem to me to only differ from the Magdalena Island shells in size. All these localities are arid; rains occur at irregular periods, sometimes three years or more apart, but copious fogs from the sea nightly refresh the vegetation.

Pilsbry speaks of the known areas of *levis* and *areolata* as separated by a "long reach of coast whence no land snails are known." From Turtle bay (a portion of, and not synonymous with San Bartolome bay, as I am told) to Magdalena bay is an arid coast unexplored by naturalists, from the lack of water and landing places, mainly unknown because overland trails traverse this portion of the peninsula away from the sea. But there is no reason to doubt the presence of this snail in some form through the entire region from San Quintin bay to Cape San Lucas.

I presume that the older naturalists, like many modern naturalists, collected sparingly, but selected specimens show-

ing the extreme variations. These were usually described by other naturalists, not the collectors, who based upon them as many species as they had individuals, through ignorance rather than intent. In conclusion, therefore, I would express agreement with the opinion of the late Dr. R. E. C. Stearns, who said (in N. Y. Acad. Ann., 2: 136) that he regarded "*H. areolata, pandorae, veatchii* and *levis* as varieties of a single species." Pfeiffer's *H. decorata* may evidently be added to the long list of synonymy. Doubtless more than a hundred varietal names may consistently be given to the various insular and peninsular forms occurring between San Quintin bay and Cape San Lucas when the whole region is fully explored.

SOME PHILIPPINE SNAILS.

BY T. D. A. COCKERELL.

My friend and former student, Dr. Cipriana Subejano, returning from the Philippine Islands, kindly brought a number of living snails collected by Mr. Maximo Oro at Los Baños, Luzon. We have now had them alive for many weeks in glass bowls, feeding them on cabbage, lettuce and sliced apples. Some have died, but three of the immense *Rhysota ovum*, four *Cochlostyla metaformis* and one *C. rufogastra* still remain in good health. The following notes may be of interest; but I have not access to the large works of Semper, Hidalgo, etc., and do not know how far the observations are new.

Rhysota ovum Val.

When giving us the snails Miss Subejano stated that these emitted a cry at times, resembling that of a young child or small animal. For some time we wondered what she could have heard, but at length the snails favored us with several separate performances. The cry, a plaintive, high-pitched note, is produced as the snail contracts into the shell, and is due to the emission of air. It is very distinctive, but is only occasionally noticed. The habits of *R. ovum* are very different from